

PROBABILITY 2



General Maths

























Preliminary

Name _____

PRELIMINARY CAPACITY MATRIX - GENERAL MATHEMATICS

TOPIC: Probability 2 – Relative frequency and probability

1.5 weeks

CONTENT	CAPACITY BREAKDOWN!	DONE IT!!!!	GOT IT!!!!	ON MY WAY!	WORKING ON IT!	HELP!!!!
1. Estimating the relative frequencies of events from recorded data	SS15.1 Ex 15A odd questions					
2. Using the definition of probability $P(event) = \frac{\text{number of favourable outcomes}}{\text{total number of sample space}}$	Ex 15B odd questions Golf task Shell-rings					
3. Calculating probabilities in terms of fractional, decimal or percentage chance	Ex 15C odd questions					
4. Demonstrating a range of possible probabilities through the examination of a variety of results	SS15.2 Ex 15D odd questions					
5. Illustrating results of a topic of interest through statistical graphs and displays	Internet task					
6. Defining and applying the relationship between complementary events $P(\text{an event does not occur}) = 1 - P(\text{event occurs})$	SS15.6 Ex 15E odd questions					

Your say!

What was the most important thing you learned? _____

What was something new you learnt? _____

What part(s) of this topic will you need to work on? _____

Relative Frequency



1. The relative frequency is used to estimate the probability of an event.
2. The relative frequency, usually expressed as a decimal, is a figure that represents how often an event has occurred.
3. The relative frequency is calculated using the formula:

$$\text{Relative frequency} = \frac{\text{number of times an event has occurred}}{\text{number of trials}}$$

4. The relative frequency can also be written as a percentage and is used to solve practical problems.

eg The weather has been fine for every day in August bar 3. Calculate the relative frequency of fine weather in August next year.

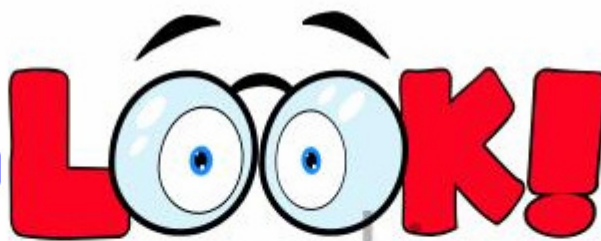
eg A light bulb company tests its 60 watt bulbs and finds that 134 out of a batch of 150 bulbs will last for more than 1000 hours.

- a) Find the relative frequency of bulbs that will last 1000 hours. (Give your answer as a percentage)

- b) A batch of 200 bulbs was tested. The batch is considered unsatisfactory if more than 15% of bulbs burn for less than 1000 hours. The results of the test are displayed in the table. Determine if the batch is unsatisfactory.

No. of hours	No. of globes
less than 500	4
500–750	12
750–1000	15
1000–1250	102
1250–1500	32
more than 1500	35

Single Event Probability



1. The sample space is the list of all possible outcomes in a probability experiment.
2. The event space is a list of all favourable outcomes to a probability experiment.
3. The probability of an event is calculated using the formula:

$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

eg Tori is rolling a die. To win the game, she must roll at least a 4.

- a) List the sample space;
- b) What is the probability that she wins.

eg Scott selects a card from a standard deck. Find the probability that he selects:

- a) an Ace;
- b) a red card;
- c) not a Spade

eg On a bookshelf there are 7 autobiographies, 4 history books, 2 Bibles and 11 fiction books. If a book is chosen at random, what is the probability that the book chosen is not a history book?

Writing probabilities as a decimal or %



1. Sometimes it is necessary to write a probability as a decimal or a percentage.
2. To write a probability as a decimal, we calculate the probability as a fraction, then divide the numerator by the denominator to convert to a decimal.
3. To write a probability as a percentage, we calculate the probability as a fraction, then multiply by 100% to convert to a percentage.

eg If Belinda selects a card from a standard deck, what is the probability of selecting a card less than 4, expressing your answer as a decimal.

eg In a bag there are 20 counters: 6 are red, 11 are green and the rest are purple. If Mitch selects a counter at random, calculate the percentage chance that the counter is not green.

The chance of an event occurring is commonly expressed as a percentage.

This is the percentage chance of an event occurring.



Range of Probabilities



1. Probabilities range from 0 to 1. A probability of 0 means that the event is impossible, while a probability of 1 means the event is certain.
2. By calculating the probability, we are able to make a connection with the more informal descriptions of chance.
3. The rules of probability can be applied only when each outcome is equally likely to occur.

When the probability of an event is 0, the event is impossible.

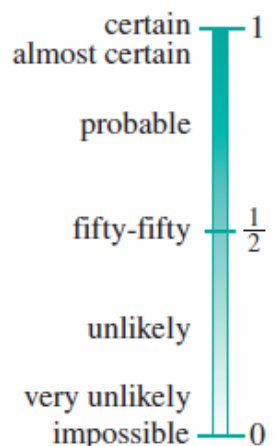
All probabilities therefore lie in the range 0 to 1. An event with a probability of $\frac{1}{2}$ has an even chance of occurring or not occurring.

The range of probabilities can be seen in the figure at right.

This figure allows us to make a connection between the formal probabilities that we calculated in the previous exercise, and the informal terms we used in chapter 14.

The closer a probability is to 0, the less likely it is to occur. The closer the probability is to 1, the more likely it is to occur.

$$0 \leq P(E) \leq 1$$



eg In a batch of 500 freezers, 30 are defective. If one freezer is chosen at random, what is the probability that it is not defective and describe this chance in words.



eg State whether the following statements are true or false, and give a reason for your answer.

a) The probability of correctly selecting a number drawn out of a bag between 1 and 10 is $\frac{1}{10}$

b) The weather tomorrow could be fine or rainy, therefore the probability of rain is $\frac{1}{2}$.

Complementary events



1. The complement of an event is the event that describes all other possible outcomes to the probability experiment.
2. The sum of the probability of an event and its complement equals 1.
3. To calculate the probability of an event, subtract the probability of its complementary event from 1.

eg In a bag with 20 counters, there are 13 black, 5 red and 2 white counters. If a counter is drawn at random from the bag, calculate:

- a) the probability of selecting a red counter;
- b) the probability of not selecting a red counter.

eg For each of the following events, write down the complementary event to:

- a) Tossing a coin and getting a Tail;
- b) Rolling a die and getting a number less than 5;
- c) Selecting a club from a standard deck of cards.